

NewsRelease

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LANGLEY ENGINEERS HELP LATEST MISSIONS LAND ON MARS

Engineers at NASA's Langley Research Center in Hampton, Va. will pay especially close attention during the launch of this month's two Mars Exploration Rover missions.

The first is scheduled as early as this Sunday, June 8, at 2:05 p.m. EDT. The next will follow in late June. The spacecraft are expected to reach Mars early next year after a seven month, 300-million-mile journey.

The Mars Exploration Rover missions seek to determine the history of climate and water at two sites on Mars where conditions may have once been favorable to life. Landers will deliver two large "robot geologist" rovers to Mars. Each carries five scientific instruments including a panoramic camera and microscopes, plus an abrasion tool that will grind away at rocks to expose their interiors for examination.

Members of Langley's Mars Exploration Rover team will be at Cape Canaveral in Florida for Sunday's launch, but a Langley Mars expert will be available locally upon request, along with a video news release and photographs.

Langley engineers have had a significant role in the mission's design, planning and execution. MER mission managers at the Jet Propulsion Laboratory called on Langley because of its expertise in atmospheric flight, especially flight dynamics, aerodynamics and aero heating. JPL, a division of the California Institute of Technology in Pasadena Calif., manages the project for NASA's Office of Space Science, Washington, D.C.

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Langley helped develop the aeroshells or capsules that will protect the rovers from the excessive heat experienced during the trip through the Martian atmosphere. The spacecraft are based on the Mars Pathfinder design from the 1990s and the Mars Viking project 20 years before that. NASA Langley led the Viking project, which successfully landed the first U.S. spacecraft on another planet in 1976.

Langley researchers also helped develop the parachute that will help slow the spacecraft during entry, descent and landing "We expanded our roles for this project by including parachute development and testing," said Prasun Desai, Langley Mars Exploration Rover mission lead. "We did a lot of testing here, as well as design and analysis of the parachute. We also did what we call a more sophisticated simulation, where we predict how the parachute-lander system is going to fly after the parachute has been inflated."

Parachute designers also benefited from the experiences of the successful Pathfinder and Viking missions. But this time the parachute is even more crucial. Its area is 20 percent larger than Pathfinder's. That's because the Mars Exploration Rovers weigh considerably more than the Pathfinder rover that landed on Mars in 1997. The parachutes must be strong enough to withstand large loads, lightweight and small enough to fit inside the capsule and must produce enough drag to slow and stabilize the capsule.

"There are challenges to testing these parachutes because we can not test it at exactly the right conditions," said Juan R. Cruz, Langley research engineer who worked on the MER parachute design. "Earth's atmosphere is the one we have to work with and the Martian atmosphere is very different, so you have to make adjustments in how you test the parachute. Another issue is the wind tunnel models we used in our tests were ten percent scale models, about five feet in diameter."

The parachutes, then airbags will help protect the rovers when they land. The two 400 pound, golf-cart sized science platforms will travel up to 130 feet each Martian day over three months. The first is scheduled to arrive on Mars January 4, 2004. The second is set to land January 25.

In the months before landing, Langley engineers will be called on again to help determine where the spacecraft is going. "We do analyses to characterize how the vehicle flies through the atmosphere when it reaches Mars," said Mark Schoenenberger, Langley aerodynamicist for the MER mission. "We provide that information to engineers for simulations of the entry, both to make sure it will pass through the atmosphere successfully and to land safely, and also so we can figure out where it's going to land."

For more information on the Mars Exploration Rover missions please check the Internet at:

<http://mars.jpl.nasa.gov/mer/>